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| JoAnn Villamizar | | | EOFF, ANCA | |
| Ciba Corporation/Patent Department | | | | |
| 540 White Plains Road | | | | |
| P.O. Box 2005 | | | | |
| Tarrytown, NY 10591 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/537,584

Applicant(s)

DESTRO ET AL.

Examiner

Anca Eoff

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-14 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 09/06/2005, 12/07/2007.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

1. The foreign priority document No. 0228647.4 filed on December 9, 2002 in the United Kingdom was received and acknowledged.

Election/Restriction

2. In response to the election requirement set forth in the previous Office Action, the applicant has elected Species III: compound (a) which comprises one or more mono-hydroxyphenyl (phenol) moieties, each carrying one or two bonds to a tetravalent linking group.

Claims 3 and 5-6 correspond to the species elected. Claims 1-2, 7-14 and 16-18 are generic claims.

Claim 4 is withdrawn.

Claim 15 is canceled.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory

double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-2 and 7-9 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 7,264,916 to Heneghan et al.

Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim a method of coloring a polymeric material, characterized in that a polymeric material comprising a phenolic latent acid and a color former is irradiated with UV light.

Heneghan et al. claim a phenolic latent acid, equivalent to the phenolic antioxidant and/or phenolic ultraviolet absorber of the instant application.

While some of the compounds claimed by Heneghan et al. are not claimed by the instant application, some of the compounds claimed by Heneghan et al. meet the limitations of the instant application (for example, a compound of formula (1) of Heneghan et al. having $R_1 = -Z_1-Q_1$, wherein Z_1 is $-NH-$ and Q_1 is a pyridine group as claimed in claims 1 and 9 meets the limitations of the instant application).

5. Claims 1-2 and 7 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 5-6 of

copending Application No. 11/593,372 (US Pg-Pub 2007/0054220) in view of Fujikawa et al. (US Patent 5,698,373).

This is a provisional obviousness-type double patenting rejection.

Heneghan claims a phenolic latent acid, equivalent to the phenolic antioxidant and/or phenolic ultraviolet absorber of the instant application.

While some of the compounds claimed by Heneghan do not meet the limitations of are not claimed by the instant application, some of the compounds claimed by Heneghan meet the limitations of the instant application (for example, a compound of formula (1) of Heneghan et al. having $R_1 = -Z_1-Q_1$, wherein Z_1 is $-NH-$, $-O-$ or $-S-$ and Q_1 is a mercaptothiazole or mercaptobenzoxazole groups as claimed in claim 2 meets the limitations of the instant application).

However, Heneghan does not claim that a color former is included in the polymeric material.

Fujikawa et al. (US Patent 5,698,373) disclose a photosensitive composition comprising a base resin (column 3, line 60), a dye precursor which forms a dye upon irradiation of actinic light, such as spiropyrans, fluorans, triarylmethanes (column 4, lines 16-36) and antioxidants (column 6, line 23-59). The dye precursor forms a dye upon irradiation to actinic light so the exposed/cured part of the composition is colored and the Uncured portion is colorless and can be easily removed (column 8, lines 16-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include dye precursor, such as spiropyrans, fluorans in the

composition of Heneghan et al. in order to differentiate between the exposed and unexposed regions of the polymeric material.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 5-11 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujikawa et al. (US Patent 5,698,373).

With regard to claims 1-2 and 17, Fujikawa et al. disclose a photosensitive composition comprising a base resin (column 3, line 60), a dye precursor which forms a dye upon irradiation of actinic light (column 4, lines 16-17). The composition may also comprise antioxidants, such as 2,2'-methylene bis (4-methyl-6-tert-butyl phenol) (column 6, lines 48-49) or 4,4'-thio-bis (3-methyl-6-tert-butylphenol) (column 6, line 35).

The base resin of Fujikawa et al. is equivalent to the polymeric material of the instant application and the dye precursor is equivalent to the color former of the instant application.

Fujikawa et al. further disclose that the composition is exposed with an ultra-high pressure mercury vapor lamp (column 8, line 15), which is well-known in the art as a source of radiation at 350 nm, as evidenced by Watanabe et al. (US Patent 6,140,007) in column 9, lines 50-52.

With regard to claim 3, Fujikawa et al. disclose 4,4'-thio-bis (3-methyl-6-tert-butylphenol) (column 6, line 35) which is a compound comprising two hydroxyphenyl moieties, each carrying one bond to a linking group (-S-) and each carrying 2 alkyl substituents (methyl and tert-butyl groups).

With regard to claims 5-6, Fujikawa et al. disclose 4,4'-thio-bis (3-methyl-6-tert-butylphenol) (column 6, line 35), which is equivalent to the compound (A) of the instant application, wherein $n=2$, R_1 is -S-, R_2 and R_3 are hydrogen atoms, R_4 is a methyl group and R_5 is a tert-butyl group.

With regard to claim 7, Fujikawa et al. further disclose that the dye precursors may be spiropyrans, fluorans or triarylmethane dyes (column 4, lines 16-28).

With regard to claim 8, Fujikawa et al. disclose that the antioxidant is preferably in the range of 1.0 to 20 parts by weight, preferably 2 to 10 parts by weight per 1 part by weight of the dye precursor (column 7, lines 4-6).

With regard to claims 9 and 18, Fujikawa et al. disclose that the dye precursor is present in an amount of 0.001 to 5 parts by weight relative to the whole photosensitive composition (column 4, lines 39-47).

With regard to claim 10, Fujikawa et al. disclose that the base resin may be a polyester, which is a transparent thermoplast as evidenced by Killey (US Patent 5,342,672) in column 11, lines 15-16.

With regard to claim 11, Fujikawa et al. disclose that the base resin may be polyamides, saturated polyesters (column 3, lines 60-61).

8. Claims 1-3, 5-6, 10-11 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Misura et al. (US Patent 5,770, 115).

With regard to claims 1-2 and 17, Misura et al. disclose a composition comprising a polymeric host material, photochromic material and a stabilizer system comprising a polyphenolic antioxidant material (a) and ultraviolet light absorber (b) (abstract). The photochromic compounds exhibit a reversible change in color when exposed to light radiation involving UV rays, such as ultraviolet radiation (column 1, lines 22-24), being equivalent to the color former of the instant application.

One of the polyphenolic antioxidants of Misura et al. is tetrakis(methylene (3,5-di-tert-butyl-4-hydroxycinnamate)) methane (column 3, lines 17-19) and one of ultraviolet light absorbers is 2-hydroxybenzophenone (column 3, line 40).

The composition is exposed to 365 nm ultraviolet light for about 15 minutes to activate the photochromic compounds (column 12, lines 29-31).

Tetrakis(methylene (3,5-di-tert-butyl-4-hydroxycinnamate)) methane of Misura et al. meets the limitation of claim 3, comprising four phenol moieties, each carrying one bond to a tetravalent alkyl group of 5 carbon atoms which is end-capped with -OCO- groups.

The 2-hydroxybenzophenone of Misura et al. meets the limitation of claim 3, being equivalent to the compound of formula (IIb), wherein G₁, G₂ and G₃ are hydrogen atoms.

The tetrakis(methylene (3,5-di-tert-butyl-4-hydroxycinnamate)) methane of Misura et al. is equivalent to the pentaerythritol tetrakis (3-(3,5-di-tert-butyl-4-

hydroxyphenyl)propionate) of the instant application and meets the limitations of claims 5-6, having a structure equivalent to the compound of formula (A), wherein $n=4$, R_2 and R_4 are tert-butyl group, R_3 and R_5 are hydrogen atoms and R_1 is a tetravalent group of 5 carbon atoms which is end-capped with -OCO- groups.

With regard to claims 10-11, Misura et al. further disclose that the polymeric host material is preferably an optically clear polymerized organic resin material prepared from a thermoplastic polycarbonate resin (column 10, lines 4-8) or a polyester (column 10, line 10).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-3, 5-13 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashihara et al. (US Patent 5,824,715) in view of Greer, IV (US Pg-Pub 2002/0057881).

With regard to claims 1-2, Hayashihara et al. disclose a marking composition comprising an energy ray curing resin and a leuco dye (abstract), equivalent to the color former of the instant application.

Hayashihara et al. further disclose that the composition may be coated on a substrate and then irradiated with excimer laser (column 7, lines 12). It is well-known in

the art that a type of excimer laser is KrF excimer laser (248 nm), as evidenced by Hasebe et al. (US Pg-Pub 2001/0005619) in par.0084.

Hayashihara et al. further disclose that the composition may comprise an antioxidant (column 6, lines 19) but fails to disclose the type of antioxidant used in the marking composition.

Greer, IV discloses a radiation-curable coating composition comprising a dye or dye precursor (abstract), equivalent to the color former of the instant application, resins (oligomers A-E in table in par.0187) and antioxidants which react with the free radicals so as to minimize or even inhibit the destruction of the dye and the coating (par.0131). Preferred antioxidants include derivatives of phenol, such as tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate)methane (par.0143). The composition of Greer, IV is cured under a D lamp (par.0205), which is known in the art for irradiating light at 257-350 nm, as evidenced by Bulters (US Pg-Pub 2002/0146225) in par.0144

Therefore, it would have been obvious to one of ordinary skill in the art at the time to include a phenolic antioxidant, such as tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate) methane as disclosed by Greer, IV in the marking composition of Hayashihara et al., with a reasonable expectation of success.

The tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate) methane meets the limitation of claim 3, comprising four phenol moieties, each carrying one bond to a tetravalent alkyl group of 5 carbon atoms which is end-capped with -OCO- groups.

The tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate) methane of Greer IV . is equivalent to the pentaerythritol tetrakis (3-(3,5-di-tert-butyl-4-

hydroxyphenyl)propionate) of the instant application and it meets the limitations of claims 5-6, having a structure equivalent to the compound of formula (A), wherein $n=4$, R_2 and R_4 are tert-butyl group, R_3 and R_5 are hydrogen atoms and R_1 is a tetravalent group of 5 carbon atoms which is end-capped with -OCO- groups.

With regard to claim 7, Hayashihara et al. further disclose that the leuco dyes may be fluoran-type dyes (column 4, lines 45-55).

With regard to claim 8, Greer IV discloses that the phenolic antioxidant is comprised in the radiation-curable composition in an amount of about 0.01wt% to about 7wt%, preferably 0.1wt% to about 1.5 wt% (par.0130)

With regard to claims 9 and 18, Hayashihara et al. further disclose that the leuco dyes are comprised in the composition in an amount between 7 and 45 wt.% , based on the energy ray curing resin (column 5, lines 1-4). However, Hayashihara et al. further disclose that if the amount of leuco dye is too small, it is impossible to obtain a clear-cut mark and if the dye is used in an excess amount, no further improvement of clearness of the mark formed is provided (column 4, line 65-column 5, line 1).

This shows that the amount of leuco dye in the marking composition of Hayashihara et al. is a result-effective variable and therefore is optimizable.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art

did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (MPEP 2144.05- II Optimization of Ranges)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the amount of leuco dye in the marking composition of modified Hayashihara, in order to obtain a clear-cut mark.

With regard to claims 10-11, Hayashihara et al. further disclose that the composition comprises polyester acrylate oligomers, equivalent to the polyacrylic polymeric material of the instant application.

With regard to claim 12, Hayashihara et al. disclose a marking composition comprising an energy ray curing resin and a leuco dye (abstract), equivalent to the color former of the instant application.

Hayashihara et al. further disclose that the composition may be coated on a substrate and then irradiated with excimer laser (column 7, lines 12). It is well-known in the art that a type of excimer laser is ArF excimer laser (193 nm), as evidenced by Hasebe et al. (US Pg-Pub 2001/0005619) in par.0084., wherein the ArF excimer laser (193 nm) is a radiation of higher energy than UV light (200-400 nm).

Hayashihara et al. further disclose that the composition may comprise an antioxidant (column 6, lines 19) but fails to disclose the type of antioxidant used in the marking composition.

Greer, IV discloses a radiation-curable coating composition comprising a dye or dye precursor (abstract), equivalent to the color former of the instant application, resins (oligomers A-E in table in par.0187) and antioxidants which react with the free radicals so as to minimize or even inhibit the destruction of the dye and the coating (par.0131). Preferred antioxidants include derivatives of phenol, such as tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate) methane (par.0143). The composition of Greer, IV is cured under a D lamp (par.0205), which is known in the art for irradiating light at 257-350 nm, as evidenced by Bulters (US Pg-Pub 2002/0146225) in par.0144

Therefore, it would have been obvious to one of ordinary skill in the art at the time to include a phenolic antioxidant, such as tetrakis (methylene 3-(3', 5'-di-t-butyl-4'-hydroxy-phenyl propionate) methane as disclosed by Greer, IV in the marking composition of Hayashihara et al., with a reasonable expectation of success.

With regard to claim 13, Hayashihara et al. further disclose that the marking composition is coated on a substrate to be marked, such as a plastic films (column 7, lines 6-23). The marking composition can be used for marking the maker's name, contents, date of production, lot number, etc. on the surfaces of the sheets, packaging sheets, cards, labels so a tag having the above-mentioned marking composition applied thereon is equivalent to the tag of claim 13 of the instant application.

With regard to claim 17, Hayashihara et al. further disclose that the marking composition may be coated on a substrate and then irradiated with excimer laser (column 7, lines 12). It is well-known in the art that a type of excimer laser is ArF excimer laser (193 nm), as evidenced by Hasebe et al. (US Pg-Pub 2001/0005619) in par.0084.,

wherein the ArF excimer laser (193 nm) is a radiation of higher energy than UV light (200-400 nm).

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashihara et al. (US Patent 5,824,715) in view of Greer, IV (US Pg-Pub 2002/0057881) as applied to claim 12 above and in further view of Fujikura et al. (US Patent 5,030,548).

With regard to claim 14, modified Hayashihara et al. disclose the method of claim 12 above (see paragraph 10 of the Office Action). The marking composition comprises radical polymerization type resins (column 3, lines 39-40), photo-initiators for curing the resin, such as benzophenone type initiators for radical polymerization resins (column 4, lines 25-26), leuco dyes (column 4, line 38), equivalent to the color former of the instant application and antioxidants (column 6, line 19).

Hayashihara et al. disclose that the marking composition may be exposed with energy rays, such as ultraviolet or electron beam (column 3, lines 32-34) but fail to disclose exposure with X-rays.

Fujikura et al. disclose a photopolymerizable composition comprising a polymeric binder, ethylenically unsaturated compounds, a photopolymerization initiator system comprising benzophenone and a leuco dye (abstract). The composition may be exposed with UV light, laser light, electron beams and X-rays (column 13, lines 10-16).

Since the marking composition of Hayashihara et al. and the photopolymerizable composition of Fujikura et al. are similar (comprise the same components), it would

have been obvious to one of ordinary skill in the art at the time of the invention to apply the teachings of Fujikura et al. and expose the marking composition of Hayashihara et al. with X-rays.

Hayashihara et al. further disclose that the developed color density of each exposed test piece is measured after irradiation/exposure (column 9, lines 59-63).

12. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts (US Patent 4,540,746) in view of Spivack et al. (US Patent 3,935,163)

With regard to claim 16, Roberts discloses polyamide fibers (column 3, line 4), such as polyhexamethylene adipamide (examples 1-5 in columns 4-7). Roberts further discloses that antioxidants and dyestuff can be incorporated into the fibers prior to the melt-spinning (column 4, lines 26-28).

The polyamide fibers of Roberts are equivalent to the synthetic polymer of the instant application and the dyestuff of Roberts is equivalent to the color former of the instant application.

However, Roberts fails to disclose the type of antioxidant used for the polyamide fibers.

Spivack et al. disclose that organic polymeric substances including polyamides, such as polyhexamethylene adipamide (column 1, lines 35-36) may be stabilized against oxidative, thermal and UV light deterioration (column 1, lines 16-18). The phenolic antioxidants provide the best thermal stabilization with the least discoloration (column 4, lines 34-37).

Therefore, it would have been obvious to one of ordinary skill in the art to include phenolic antioxidants as disclosed by Spivack et al. in the polyamide fibers of Roberts, in order to obtain the best thermal stabilization of the polymeric fibers with the least discoloration (Spivack et al, column 4, lines 34-37).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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AE *JE*

Cynthia H. Kelly

**CYNTHIA H. KELLY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700**